*DRAFT

The United States' Experience with Energy-Based Tax Incentives: The Evidence Supporting Tax Incentives for Renewable Energy

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Developing sustainable markets for renewable energy technologies presents complex challenges. Financial, institutional and informational obstacles impede advancement of these technologies. Tax incentives are often utilized to assist policy makers in dealing with these challenges.[1] Because tax incentives and subsidies generally decrease governmental revenues, understanding their costs and benefits is critical in determining policy choices. For almost 90 years, the United States has granted tax incentives, direct subsidies and other support to the energy industry in an effort to enhance U.S. energy supplies. Historically, those incentives targeted only fossil fuel industries. Since the late 1970s, however, Congress has enacted incentives to encourage investment in technology and production of alternative and renewable energy sources. In 2005, in fact, tax incentives dominated the energy policy legislation.[2] Studies evaluating the effectiveness of these tax incentives (both for conventional energy sources and alternative energy technologies) vary in their conclusions.[3] Drawing upon these studies, this paper appraises the use of tax incentives to stimulate alternative fuel sources, renewable and non-renewable. Ultimately, policy makers should use criteria developed to assist in designing tax incentives to promote the development of renewable fuel sources and reduce the U.S. dependence on fossil fuels.

Part I of the paper considers the use of tax incentives to promote the fossil fuel industry in its early stages of development. Because these same tax incentives are still in effect today, their continued efficacy is likewise discussed. Part I also addresses the impact of newer tax incentives designed to stimulate fossil fuel production at the margins. Part II describes the use of "environmentally-friendly" tax incentives. This section discusses existing, proposed and expired tax incentives that target renewable and alternative energy sources. Part III considers lessons to be learned from the U.S.' long history with energy tax incentives. The analysis focuses on effectiveness of the various tax incentives and identifying features that correlate positively with the goal of

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[1] Incentives are typically used (1) to promote a new technology during the early stages of development and (2) to pay the differential between the value of an activity to the private sector and its value to the public sector. BRUCE W. CONE & ALEX G. FASSBENDER, AN ANALYSIS OF FEDERAL INCENTIVES USED TO STIMULATE ENERGY PRODUCTION, at EXECUTIVE SUMMARY 7 (1978); Salvatore Lazzari, *CRS Report for Congress,* Energy Tax Policy: An Economic Analysis, June 28, 2005, at Summary [hereinafter Lazzari Economic Analysis].

[2] *See* Energy Tax Incentives Act of 2005, H.R. 6 (July 28, 2005) (This legislation is the most significant energy policy legislation since 1992 and took many years to accomplish.).

[3] As an economic good, fossil fuels differ from other commodities in three ways which may call for government intervention in the market: (1) fossil fuels are a depletable resource, (2) fossil fuel consumption produces adverse environmental impacts, and (3) energy is a major factor in our economy such that disruptions to the energy market have macroeconomic impacts. *See* Lazzari Economic Analysis, at 6.

stimulating technology, investment and public acceptance. The U.S. experience in subsidizing the fossil fuel industries provides the milieu upon which all options for shifting to renewable energy technologies must be considered. In addition, this section critiques the interplay between incentives supporting fossil fuels and incentives encouraging alternative energy sources. The United States' dependence on fossil fuels, which supply more than 86 percent of our energy supply, shows no signs of abatement.[4] The United States needs to formulate a strategy to eliminate fossil fuel subsidies in favor of alternatives. Finally, Part IV concludes with a set of standards that can facilitate the development of tax incentives and provide cost effective alternative and renewable fuels with the greatest return on the government's investment.

Early empirical work studying the impact of oil and gas tax incentives on resource allocation consistently concluded that these special provisions did result in the petroleum industry maintaining a larger investment in petroleum reserves than it would have absent these policies.[5] However, these early studies were inconclusive in evaluating the cost/benefit of these tax incentives. The earliest information focuses on the petroleum industry's rate of return on investment as compared to other industries. This information reveals that tax incentives substantially increased the rate of return for the petroleum industry, but provides little information regarding the correlation between these tax breaks and the investment in oil and gas.[6] In a later study, the Treasury concluded that the annual cost of the percentage depletion deduction ($1 billion) far exceeded the annual additions to oil and gas reserves ($150 million) during the 1960s.[7] Moreover, these incentives have not resulted in conservation of the oil and gas reserve, nor have they decreased U.S. security concerns associated with foreign imports. The General Accounting Office stated that "developing alternatives, increasing fuel efficiency in transportation, and continuing the development of the Strategic Petroleum Reserve" would likely increase U.S. energy security more than additional oil and gas tax incentives.[8] Despite spotty data, the U.S. continues its questionable practice of investing billions of dollars to facilitate exploration and production of fossil fuels. At a minimum, these instruments must be redesigned as transitional tools in combination with increased investment in new energy sources.

Studies evaluating the effectiveness of tax incentives for alternative fuel technologies confirm that tax incentives (or other incentives) are necessary to the development of this industry. Entering into the current energy industry with its deeply entrenched fossil fuel infrastructure presents potential investors with difficult barriers. For example, without the federal tax incentives to keep its price competitive with

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[4] ENERGY INFO. ADMIN., 2004 ANN. ENERGY REVIEW REP. DOE/EIA-0384, at Table 1.1 (2004) [hereinafter 2004 ANNUAL ENERGY REVIEW].

[5] *See* James C. Cox & Arthur W. Wright, *The Cost-effectiveness of Federal Tax Subsidies for Petroleum: Some Empirical Results and Their Implications*, *in* STUDIES IN ENERGY TAX POLICY 188, 192 (Brannon ed., 1975).

[6] *See* HAROLD F. WILLIAMSON, ARNOLD R. DAUM, & GILBERT C. KLOSE, THE AMERICAN PETROLEUM INDUSTRY: THE AGE OF ENERGY 1899-1950, at 334-35 (1963) (an FTC study calculated the rate of return for oil companies between 1922-1926).

[7] RICHARD B. MANCKE, THE FAILURE OF U.S. ENERGY POLICY 87 (1974).

[8] GEN. ACCOUNTING OFFICE., GAO/GGD-90-75, TAX POLICY: ADDITIONAL PETROLEUM PRODUCTION TAX INCENTIVES ARE OF QUESTIONABLE MERIT 42 (1990) [hereinafter GAO, QUESTIONABLE MERIT].

conventional fuels, no market would exist for alcohol fuels, and thus, no capital.[9] Alternative energy sources have the potential to reduce petroleum consumption, reduce greenhouse gas emissions, and produce significant energy savings. To date, however, they are not used enough to have much impact on the environment. Nor have they been effective in increasing the supply of oil reserves or reducing dependence on foreign imports. For example, several recent studies indicate that even with increasing purchases of alternative fuel vehicles by federal agencies, state governments, and private consumers, "alternative fuel use in the transportation sector remains very small."[10] Furthermore, as long as fossil fuels remain relatively inexpensive, alternative energy industries will not be competitive. The U.S. must eliminate fossil fuel subsidies and invest in renewable energy before any real gains will be realized.

Tax incentives, if properly structured, can play a valuable role in moving the U.S. towards a sustainable energy future. A detailed analysis of the effectiveness of energy tax incentives reveals a number of guiding principles to be used in formulating tax incentives promoting alternative energy sources. For example, tax incentives should stimulate the commercialization of advanced technologies. Such incentives must be substantial in the initial stages of the subsidy in order to overcome barriers to entry into the market. Concomitantly, tax incentives should target technologies where the initial cost is the major barrier. Governments also need to be flexible in terms of who receives incentives and allow adequate time before phasing them out. Finally, tax incentives need to be part of a mix of policy initiatives and work in complementary fashion with other strategies.

Part I: Tax Incentives that Encouraged the Development of the Fossil Fuel Industry

The federal government has used tax incentives to affect social, economic and political goals since the inception of the income tax. The use of such targeted tax incentives violates principles of tax neutrality when they deviate from the generally accepted structure of an income tax.[11] In essence, such tax incentives implement government policy apart from any revenue raising impact that is the purported function of the tax system. The choice to use the tax system to implement the government's social or political policies rather than through direct spending programs should require public discourse regarding their use. The advent of the tax expenditure budget in the 1970s forced policy makers to quantify these "tax subsidies" increasing the transparency of

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[9] *See* GEN. ACCOUNTING OFFICE, GAO/GGD-97-41, TAX POLICY: EFFECTS OF THE ALCOHOL FUELS TAX INCENTIVES 1 (March 6, 1997) [hereinafter GAO, ALCOHOL FUELS TAX].

[10] *See* GEN. ACCOUNTING OFFICE, GAO-01-957T, ALTERNATIVE MOTOR FUELS AND VEHICLES: IMPACT ON THE TRANSPORTATION SECTOR 1 (July 10, 2001) [hereinafter GAO IMPACT].

[11] For example, the matching principle used in financial accounting is a starting point for the determination of net income for tax purposes. The matching principle requires that net income be measured by offsetting revenues with those expenses that generated that revenue. Therefore, the immediate write off of a capital expenditure that is expected to generate revenue over a number of financial periods would violate the matching principle. Charles O. Galvin, *The "Ought" and "Is" of Oil-And-Gas Taxation,* 73 HARV. L. REV. 1441, 1443 (1960). *See also* Lazzari Economic Analysis, supra note --, at 6-7.

using the tax system for reasons other than revenue raising.[12] The next two sections discuss those tax incentives used to promote the energy industry, their justifications and their effectiveness.

The federal government has used tax incentives to promote the fossil fuel industry since the early stages of the industry's development. Federal incentives targeting the energy industry have been justified on several grounds: 1) to encourage oil and gas production and exploration during the initial stages of development; 2) to compensate for the value differential of an activity between the private sector and the public sector;[13] and 3) to overcome the risks and hazards associated with producing oil and gas.[14] The federal government has justified its support for the oil and gas industry over the last century on these grounds.

At the turn of the twentieth century, when the exploration and development of fossil fuels was in its infancy, policy makers began to realize the amazing possibilities that fossil fuel energy afforded. Petroleum, in particular, seemed to be the perfect fuel. The federal government soon began investing in those technologies designed to exploit this burgeoning energy source. Since the early 1900s, federal tax incentives have constituted part of that investment. As American dependence on the technologies that used fossil fuels (like cars and electricity) increased, Congress continued to use tax incentives to encourage the exploration and development of oil and gas. Arguing that the U.S. must do all it can to encourage the search for more oil (including more tax incentives), one 1958 article stated "A healthy oil industry, providing an adequate and dependable supply of crude petroleum, is essential to our national security and prosperity. It is one of the major factors responsible for the high standard of living in the United States." [15] By the early 1970s, the United States realized that the domestic supply of oil was fixed and relatively determined while the U.S. demand for oil showed no signs of slowing. The basis for continued tax incentives for fossil fuels had moved from one of support of a fledgling industry to price support for American fuel demands.[16]

The Percentage Depletion Allowance and Intangible Drilling Costs Overview:

For almost 100 years, two very important tax incentives have been available for businesses that explore for and produce oil and gas: (1) the percentage depletion allowance and (2) the deduction for intangible drilling costs. Similar to depreciation of a tangible asset, the original depletion allowance provided for cost recovery of an owner's

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[12] Stanley S. Surrey, *Tax Incentives as a Device for Implementing Government Policy: A Comparison with Direct Government Expenditures*, 83 HARV. L. REV. 705 (1970).

[13] BRUCE W. CONE & ALEX G. FASSBENDER, AN ANALYSIS OF FEDERAL INCENTIVES USED TO STIMULATE ENERGY PRODUCTION, at EXECUTIVE SUMMARY 7 (1978); Lazzari Economic Analysis, supra note --, at 8, 11.

[14] F. J. Blaise, *What* every tax man should know about percentage depletion, TAXES – THE TAX MAGAZINE June 1958, at 397; Lazzari Economic Analysis, supra note – at 12.

[15] The article's author was the assistant secretary-treasurer and manager of the Income Tax Department for The Pure Oil Company in Chicago. *Id*.

[16] A 1978 report analyzing such incentives concluded that subsides for the fossil fuel industry fell under the second rationale. CONE, *supra* note, at Executive Summary 7.

mineral investment.[17] Such cost recovery recognizes the wasting nature of the mineral deposit as it is extracted from the ground. Typically, the purchase price of the property, discovery costs and development costs are included in the capital costs of the mineral investment. Two methods of depletion are allowable – cost depletion and percentage depletion. A taxpayer using cost depletion recovers the actual costs of the mineral investment over its producing life based on the amount of the mineral extracted each year.[18] Cumulatively, cost depletion deductions can not exceed the original capital investment. Congress also adopted percentage depletion[19] to encourage exploration and production activities. Under percentage depletion, taxpayers are permitted to deduct a fixed percentage of the gross value of annual production.[20] Percentage depletion is computed without regard to the taxpayer's actual investment in the property. As a result, cumulative percentage depletion deductions can exceed the original investment costs. If the value of the mineral deposit exceeds the original cost of the investment, percentage depletion affords the investor a bigger tax deduction and, thus, a significantly reduced tax rate, based on successful production.[21] Moreover, the use of percentage depletion does not restrict a taxpayer from taking additional deductions from gross income of nearly all of the actual exploration and development costs.[22]

In addition to percentage depletion, taxpayers may immediately deduct their intangible drilling and development costs (IDCs).[23] Unlike similar costs in other businesses, these costs are not required to be capitalized. IDCs typically include labor, fuel, hauling, power, materials, supplies, tool rental, repairs of drilling equipment and other items incident to and necessary for the drilling and equipping productive wells.[24] In addition, the costs associated with a nonproductive well or "dry hole" (which make up about 80 percent of all wills drilled) are deductible when incurred and can offset other sources of income.[25] If the taxpayer chooses to capitalize these costs, they are recovered through depletion or depreciation deductions.[26] The percentage depletion allowance and the intangible drilling cost deduction account for the most significant federal investment in the fossil fuel industry.

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[17] *See* GEN. ACCOUNTING OFFICE, PETROLEUM AND ETHANOL FUELS: TAX INCENTIVES AND RELATED GAO WORK 5 (Sept. 25, 2000) [hereinafter GAO REPORT 2000].

[18] *See id.*; STEPHEN L. MCDONALD, FEDERAL TAX TREATMENT OF INCOME FROM OIL AND GAS 9 (1963).

[19] Percentage depletion replaced discovery value depletion because of the difficulty in determining discovery value of wells. Congress believed that percentage depletion, intended to approximate discovery value depletion, would be more administratively feasible. MCDONALD, *supra* note ___ , at 15; JOINT COMMITTEE ON INTERNAL REVENUE TAXATION, PRELIMINARY REPORT ON DEPLETION 4 (1929), *reprinted in* INTERNAL REVENUE ACTS OF THE UNITED STATES 1909-1950, LEGISLATIVE HISTORIES, LAW, AND ADMINISTRATIVE DOCUMENTS (ed. Bernard Reams, 1979).

[20] Treas. Reg. § 1.612-1.

[21] *See* MCDONALD, *supra* note ___, at 12-13.

[22] *See* MCDONALD, *supra* note ___, at 15.

[23] *See* I.R.C. § 263(a); MCDONALD, *supra* note ___, at 15.

[24] Treas. Reg. § 1.612-4(a).

[25] Treas. Reg. § 1.612-4(b)(4); *See* Salvatore Lazzari, *CRS Issue Brief for Congress*, ENERGY TAX POL'Y, August 20, 2003, at 2 (Updated June 21, 2005). Lazzari, at CRS-2 (2005).

[26] *See* Treas. Reg. § 1.612-4(b); GAO REPORT 2000, *supra* note __, at 8; MCDONALD, *supra* note __, at 10.

Other Tax Incentives for the Oil and Gas Industry:

As the U.S. oil reserves began to decline, fossil fuel incentives necessarily targeted technologies developed to extract petroleum under harsher conditions. Since the 1970s, Congress has added new tax incentives to foster exploration and development of more marginal oil resources, while scaling back on the percentage depletion and IDC deductions. Large revenue losses associated with percentage depletion and IDC deductions made them harder to justify in light of budget deficits and longstanding economic arguments against them.[27] The provisions described in this section subsidize the cost of producing petroleum that is more difficult to extract. While the effect of these provisions has been more limited, they demonstrate the federal government's continued policy in favor of fossil fuels, and they undercut the effect of scaling back percentage depletion and IDC deductions.

Tax Credits for Unconventional Fuels and Enhanced Oil Recovery Costs:

As part of the Crude Oil Windfall Profit Tax Act of 1980, Congress authorized producers of certain qualifying fuels from nonconventional sources, including some oil and gas, to claim a tax credit equal $3 (in 1978 dollars) per barrel or Btu oil barrel equivalent.[28] Qualifying fuels include (1) oil produced from shale and tar sands; (2) gas produced from goepressured brine, Devonian shale, coal seams, a tight formation, or biomass;[29] and (3) liquid, gaseous, or solid synthetic fuels produced from coal.[30] To qualifying for the credit, the fuel must be produced domestically from wells, mines or plants placed in service prior to July 1, 1998 (for coal and biomass) and December 31, 1992 (for all other facilities and wells). For most fuels, the section 29 credit has expired, except for certain biomass gas and synthetic fuels sold before January 1, 2008. Adjusted for inflation, this credit was $6.56 per barrel of liquid fuels in 2004.[31] As discussed below, Congress expanded and extended this credit in 2005.

Since 1990, taxpayers can claim a credit for qualified tertiary oil recovery costs incurred in the production of oil and gas on domestic projects.[32] Through this credit, Congress hoped to extend the lives of older wells with higher marginal production costs. Taxpayers are allowed to claim a general business credit equal to 15 percent of costs attributable to enhanced oil recovery (EOR) projects.[33] Qualified costs include tertiary

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[27] *See* Lazzari, *supra* note __, at 2.
[28] *See* GAO Report 2000, *supra* note __, at 10.
[29] *See id.* at 10. Biomass is any organic material other than oil, natural gas, or coal, or any product these fuels. *Id.* Biomass is a renewable fuel and is considered again in Part ___.
[30] I.R.C. § 29(c).
[31] *See* Conferees' Agreement on H.R. 6, Energy Policy Act of 2005, Energy Tax Incentives Act of 2005, Title XIII, Daily Tax Report S-40 (July 28, 2005); Salvatore Lazzari, *CRS Issue Brief for Congress*, ENERGY TAX POL'Y, August 20, 2003, at 1. The credit must be offset by benefits from government grants, subsidized or tax-exempt financing, energy credits, and the enhanced oil recovery credit. *See* I.R.C. § 29; *See* GAO REPORT 2000, *supra* note __, at 10; Lazzari, *supra* note__, at 4.
[32] I.R.C. § 43; Congress expanded the credit in 2004 to include the costs of constructing gas treatment plants located in Alaska. *See* I.R.C. § 43(c)(1)(D) as added by the American Jobs Creation Act of 2004, section 707.
[33] I.R.C. § 43(a).

injectant expenses, IDCs on a qualified EOR project, and amounts incurred for tangible depreciable property.[34] A qualified EOR project must be located in the United States and involve the application of tertiary recovery methods that will likely result in "more than an insignificant increase" in the amount of recoverable oil.[35] The credit amount is reduced if the average price of crude oil exceeds $28 (adjusted for inflation) and is phased out ratably over a $6.00 phase-out range.[36] In 2004, for example, the credit did not phase out based on the reference price for oil that year.[37]

Energy Tax Incentives Act of 2005:

Congress passed significant energy legislation in August 2005 containing tax incentives for both the fossil fuel industry and its infrastructure and the alternative and renewable fuel industry. Tax breaks for domestic fossil fuels constituted well over half of the government expenditure over a 10 year period.[38] Some of the highlights are discussed in this section.

Congress added to the unconventional fuels credit, discussed above, a production credit for qualified facilities that produce coke or coke gas for qualified facilities. The $3.00 credit is available for up to 4,000 barrel of oil equivalent. The credit for these fuels extends until January 1, 2010. In addition, this credit is now part of the general business credit, thus making carry back and carry forward of unused credits available.[39]

Congress enacted several incentives to stimulate oil and gas production. The new law increased the number of oil and gas producers that will be able to claim percentage depletion by qualifying as independent producers. A producer is independent only if its refining and retail operations are relatively small. Prior to the change, to qualify, a producer could not have refining operations in which production exceeded 50,000 barrels on any day during the taxable year in which independent producer status is claimed.[40] The law now allows producers to refine up to 75,000 barrels based on average daily production.[41] In addition, certain natural gas distribution lines and electricity transmission property can be depreciated over 15 years rather than 30 years, and natural

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[34] *See* GAO REPORT 2000, *supra* note__, at 13; I.R.C.§ 43(c). To the extent that a credit is allowed for such costs, the taxpayer must reduce the amount of otherwise deductible or capitalizable and recoverable costs. I.R.C. § 43(d).

[35] *See* GAO REPORT 2000, *supra* note__, at 13; JOINT COMMITTEE ON TAXATION, JCX-84-00, PRESENT LAW AND DESCRIPTION OF PROPOSALS RELATING TO FEDERAL INCOME TAX PROVISIONS THAT IMPACT ENERGY, FUEL, AND LAND USE CONSERVATION AND PRESERVATION 3 (July 24, 2000), Congress made no changes to this provision in the 2005 Energy Act. Explanation of the Energy Tax Incentives Act of 2005, S-58, DTR (July 28, 2005).

[36] I.R.C. § 43(b).

[37] *See* Description and Technical Explanation for Energy Tax Incentives Act of 2005, Title XIII of Energy Policy Act of 2005 (H.R. 6), as Agreed by Conferees, BNA Daily Tax Report at S-58 (July 28, 2005).

[38] Joint Committee on Taxation, Estimated Budget Effects of the Conference Agreement for Title XIII of H.R. 6, The "Energy Tax Incentives Act of 2005," DTR at S-95 (July 28, 2005).

[39] Explanation of the Energy Tax Incentives Act of 2005, S-40, DTR (July 28, 2005) (now codified at I.R.C. § 45K).

[40] *See* I.R.C. § 613A(d)(4).

[41] Explanation of the Energy Tax Incentives Act of 2005, S-44, DTR (July 28, 2005).

gas gathering lines can be depreciated over 7 years rather than 15 years.[42] Geological and geophysical costs are now amortizable over a 2 year period.[43] Congress also provided a temporary election to expense qualified oil refinery property. A taxpayer may expense 50 percent of qualified refinery property used in the refining of liquid fuels for property (1) with a binding construction contract prior to January 1, 2008; (2) placed in service before January 1, 2012; and (3) that meets increased capacity requirements.[44] Ordinarily, petroleum refining assets are recovered over a 10 year period.

Congress also created 2 new credits for investment in certain clean coal technologies. A 20 percent investment tax credit is available for property associated with gasification of coal, including any coal handling and gas separation equipment. A 15 percent tax credit is available for other advanced coal-based projects. A 20 percent credit is available for certain certified gasification projects as well.[45]

The new Energy Tax Act of 2005 provides significant additional government investment into the existing non-renewable energy infrastructure. While several of these provisions are designed to encourage more efficient use of fossil fuels, a number of these incentives target exploration and development of petroleum. Most of the available studies suggest that these tax incentives are not cost effective and have little or no impact on energy production.[46]

Part II: Tax Incentives that Promote Renewable and Alternative Energy Sources.

Based on the problems associated with over reliance on petroleum, the federal government has invested in energy efficiency programs and the development of alternative fuel sources. Complacent during the 1980s and 1990s, the terrorist attack of 2001, the Iraq war, environmental problems associated with global climate change, and the recent devastation to the Louisiana coast have lead to heightened concern for energy security, a vulnerable energy infrastructure and the need to develop alternatives.[47] This section discusses existing, proposed and expired tax incentives that target renewable and alternative energy sources.

Tax Incentives for Alternative Fuel Technologies:

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[42] Explanation of the Energy Tax Incentives Act of 2005, S-38, S-39, DTR (July 28, 2005).
[43] Explanation of the Energy Tax Incentives Act of 2005, S-62, S-63, DTR (July 28, 2005). The law had been unsettled with respect to whether or not these costs were amortizable and over what time period.
[44] Explanation of the Energy Tax Incentives Act of 2005, S-56, 57, DTR (July 28, 2005).
[45] Explanation of the Energy Tax Incentives Act of 2005, S-54, DTR (July 28, 2005).
[46] Energy Information Administration, Analysis of Five Selected Tax Provisions of the Conference Energy Bill of 2003 at 2 (February 2004). This study considered provisions that did not get enacted until 2004-2005 including Section 45 Credit for Electricity Produced from Certain Sources, Credit for Electricity produced from Advanced Nuclear Power Facilities, Amortization of Geological and Geophysical Costs over 2 years, extension and modification of section 29 for producing fuel from nonconventional sources, and enhanced oil recovery tax credits.
[47] *See* Fred Sissine, Energy Efficiency: Budget, Oil Conservation, and Electricity Conservation Issues, CRS Issue Brief for Congress, at Summary (June 17, 2005).

Since the early 1900s, when U.S. petroleum consumption began in earnest, demand for petroleum has grown rapidly. U.S. demand for oil has yet to peak and, even in light of recent gasoline price increases, is extremely price resilient. Yet, crude oil production from the lower 48 states reached its peak in 1970 when oil and gas accounted for 71.1 percent of total U.S. energy production.[48] Oil production in Alaska delayed the decline in overall U.S. oil production until 1988 when Alaska's oil production peaked.[49] By 1994, the U.S. imported more oil than it produced. By 2004, net foreign imports accounted for 58 percent of the petroleum supply.[50] Since the 1970s, policy makers motivated by a combination of declines in production, increases in demand, oil embargoes, oil price and supply shocks, wide petroleum price variations and price spikes, rising oil import dependence, and increased evidence of the seriousness of environmental problems associated with fossil fuels have employed energy taxes and subsidies to help alleviate these problems.[51] And for the first time, in the Energy Tax Act of 1978, Congress enacted a several tax provisions designed to encourage energy conservation and develop alternative fuels.[52]

Despite a decade of significant environmental legislation enacted during the 1970s and increased governmental regulation of pollutants, these ("environmentally-friendly") tax incentives are inconsequential when compare with the federal investment in exploitation of fossil fuels. The overwhelming majority of energy tax incentives continue to support businesses that extract, produce, and transport non-renewable resources. Although federal support is slowly increasing, industries involved in developing renewable energy do not get the government assistance and commitment that the fossil fuel industries have enjoyed.

The earliest environmental tax incentives included tax credits for investing in energy conservation products (insulation and other energy conservation components) and solar and wind energy equipment installed in a home or business.[53] The residential energy income tax credit provided a credit of 30 percent of the first $2,000 and 20 percent of the next $8,000 for solar and wind energy equipment costs.[54] Investments in conservation or alternative fuel technologies, such as solar, wind, geothermal, and ocean thermal technologies were eligible for a ten percent business energy tax credit.[55] In addition, Congress authorized the percentage depletion deduction for geothermal

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[48] *See* Lazzari, *supra* note___**,** at 2.

[49] *See* ENERGY INFO. ADMIN., ENERGY IN THE UNITED STATES: 1635-2000, at 2, http://www.eia.doe.gov/emeu/aer/eh/petro.html.

[50] *See* ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 127 (2004) [hereinafter 2004 ANNUAL ENERGY REVIEW].

[51] *See* Lazzari, *supra* note __, at 1.

[52] ENERGY TAX ACT OF 1978, Pub. L. No. 95-618, 92 Stat. 3174 § 301(a)(1) (1978).

[53] *See* I.R.C. § 46 (2004); Lazzari, *supra* note __, at 4.

[54] ENERGY TAX ACT OF 1978, Pub. L. No. 95-618, § 101(a) (1978); ENERGY INFO. ADMIN., LEGISLATION AFFECTING THE RENEWABLE ENERGY MARKETPLACE, *at* http://www.eia.doe.gov/cneaf/solar.renewables/page/legislation/impact.html (last visited Jun. 30, 2004); Lazzari, *supra* note __, at 4.

[55] Energy Tax Act of 1978, Pub. L. No. 95-618, § 301(a)(2)(B) (1978); LEGISLATION AFFECTING THE RENEWABLE ENERGY MARKETPLACE, *supra* note __; Lazzari, *supra* note __, at 4.

deposits.[56] In 1980, Congress increased the residential energy tax credit to 40 percent of the first $10,000 of equipment expenses and the business energy tax credit to 15 percent for solar, wind, geothermal and ocean thermal technologies, adding biomass to the list technologies eligible for the credit.[57] Except for the tax credit for solar property, these credits expired by December 31, 1985. Since 1992, a 10 percent investment tax credit for business use of solar and geothermal energy is all that remains from these early energy tax credits.[58] This credit applies to the cost of new equipment (1) that uses solar energy to generate electricity, to heat or cool a structure, or to provide solar process heat,[59] or (2) that is used to produce, distribute, or use energy derived from a geothermal deposit, but only, in the case of electricity generated by geothermal power, up to the electric transmission stage.[60] In 2005, Congress increased the amount of the credit to 30 percent, but only through December 31, 2007.[61] Congress also added equipment that uses fiber-optic distributed sunlight to illuminate the inside of a structure as eligible property, but again only through the end of 2007. Finally, the rules state that any property used to heat a swimming pool is not eligible for the credit.

In 1992, Congress also enacted the renewable electricity production credit (PTC) for electricity generated from qualified energy resources ("QER").[62] QERs originally included wind energy, "closed-loop" biomass, or poultry waste facilities.[63] In 2004, Congress expanded QERs to include five new types: (1) geothermal energy, (2) solar energy, (3) small irrigation power, (4) municipal solid waste, and (5) refined coal.[64] In 2005, Congress again expanded the QERs to include: (1) qualifying hydroelectric power facilities and (2) qualified Indian coal facilities.[65] QERs must also be produced at qualified facilities.[66] For certain QERs, taxpayers may take the credit during the first 10 years of production at a rate of 1.9 cents per kilowatt-hour in 2005.[67] For other QERs, the credit is reduced by half to 9.5 cents per kilowatt-hour and the credit period is

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[56] Energy Tax Act of 1978, Pub. L. No. 95-618, § 403(a); LEGISLATION AFFECTING THE RENEWABLE ENERGY MARKETPLACE, *supra* note __; Lazzari, *supra* note __, at 4. The applicable rate began at 22 percent and was phased down to 15 percent by 1983.

[57] *See* CRUDE OIL WINDFALL PROFITS TAX ACT OF 1980, Pub. L. No. 96-223; Lazzari, *supra* note__, at 4; LEGISLATION AFFECTING THE RENEWABLE ENERGY MARKETPLACE, *supra* note __, at 1.

[58] *See* I.R.C. § 48.

[59] *See* I.R.C. § 48(a)(3)(A)(i).

[60] *See* I.R.C. § 48(a)(3)(A)(i).

[61] *See* Explanation of the 2005 Energy Act, S-60, S-61. Add definition of hydro and Indian coal.

[62] *See* I.R.C. § 45(a).

[63] *See* I.R.C. § 45(c). Closed-loop biomass is plant matter, where the plants are grown for the sole purpose of being used to generate electricity. It does not include waste materials. Poultry waste means poultry manure and litter, including wood shavings, straw, rice hulls, and other bedding materials for the disposition of manure. *Id.*

[64] *See* I.R.C. § 45(c). Poultry waste is now included in a category called "open-loop biomass" which broadened the category to include other agricultural livestock waste. I.R.C. § 45 (c)(3).

[65] *See* Explanation of the 2005 Energy Act, S-47, S-48.

[66] *See* I.R.C. § 45 (d) (describing the facilities, as expanded in 2004, that qualify for the purposes of the tax credit).

[67] *See* Explanation of the 2005 Energy Act, S-44; Notice 2004-29, I.R.B. 2004-17, 828; I.R.C. § 45(a). The credit is reduced for grants, tax-exempt bonds, subsidized energy financing, and other credits. I.R.C. § 45(b)(3).

reduced to 5 years.[68] To be eligible to claim the credit, the property must be placed in service prior to January 1, 2008.[69]

Enacted in 1978, the "Gas Guzzler Tax," is a federal excise tax that applies to the sale of cars with fuel economy rating below statutorily set standards to encourage gasoline conservation.[70] While not an incentive promoting alternative fuel technologies, it does encourage energy efficiency through technological innovations on existing gasoline-powered engines. Under the statute, both the excise tax and the fuel economy standards increased for each model year from 1980 through 1986. Between 1987 and 1990, Congress failed to adjust either the fuel efficiency or the fuel economy standards.[71] Congress finally updated these standards in 1990, but has not adjusted them since.[72] For cars that do not meet the minimum fuel economy standard set by the Environmental Protection Agency, the amount of tax imposed depends on how far the fuel efficiency falls below the EPA standards.[73] For vehicles with fuel economy of at least 22.5 miles per gallon, no excise tax is imposed. For vehicles with a fuel economy of less than 22.5 percent, the excise tax begins at $1,000 increasing to $7,700 for cars with a fuel economy of less than 12.5 miles per gallon.[74] Unfortunately, vehicles that weigh over 6,000 pounds, the biggest polluters, are exempt from the gas-guzzler tax. Currently, over 55 different models of luxury automobiles (and SUVs) are exempt from this excise tax.[75]

In 1978, the federal government also invested in alternative fuels through two tax incentives for ethanol and methane derived from renewable sources. The "alcohol fuels credits" included: (1) a partial exemption from the federal excise tax on motor fuels[76] and (2) three income tax credits for renewable alcohol-based motor fuels.[77] Proponents had hoped that the tax incentives for alcohol fuels would reduce the U.S. dependence on imported fuel and provide much-needed support for farm incomes by finding another market the agricultural products, such as corn, from which alcohol can be produced.[78]

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[68] Open-loop biomass facilities, small irrigation power facilities, landfill gas facilities and trash combustion facilities are only eligible for the 9 cent credit. *See* I.R.C. § 45(b)(4)(A). These same facilities plus the geothermal or solar energy facilities may only claim the credit for the first five years of production. *See* I.R.C. § 45(b)(4)(B).

[69] *See* I.R.C. § 45(c)(3) as amended by THE WORKING FAMILIES TAX RELIEF ACT OF 2004, H.R. 1308, § 314(a) (Sept. 23, 2004) [hereinafter WORKING FAMILIES TAX ACT]. I.R.C. § 45 was amended again by the Energy Tax Act of 2005 extending the placed in service date to December 31, 2007, however, the placed in service date for solar facilities is December 31, 2005 and the placed in service date for refined coal facilities is December 31, 2008. *See* Description and Technical Explanation for Energy Tax Incentives Act of 2005, DTR at S-47, S-48.

[70] *See* I.R.C. § 4064.

[71] *See* JOINT COMMITTEE ON TAXATION, PRESENT LAW AND BACKGROUND RELATING TO FEDERAL ENVIRONMENTAL TAX POLICY 11 (March 1, 1990).

[72] *See* I.R.C. § 4064(a).

[73] *See* JOINT COMMITTEE ON TAXATION, PRESENT LAW AND BACKGROUND RELATING TO FEDERAL ENVIRONMENTAL TAX POLICY, *supra* note __, at 10.

[74] I.R.C. § 4064 (a).

[75] *See* GREEN SCISSORS, GREEN SCISSORS 2004: CUTTING WASTEFUL AND ENVIRONMENTALLY HARMFUL SPENDING 13 (2004), *at* http://www.greenscissors.org. These models include the Lincoln Navigator, the Cadillac Escalade and the Hummer H2.

[76] This tax is earmarked for the Highway Trust Fund. *See* GAO REPORT 2000, *supra* note __, at 16.

[77] *See* I.R.C. §§ 38, 40, 87; GAO REPORT 2000, *supra* note __, at 17-18.

[78] *See* GAO, ALCOHOL FUELS TAX, *supra* note ___ at 1?

Using alcohol fuels as additives to fossil-based fuels to reduce urban air pollution also made these initiatives attractive. Of the two tax incentives, the partial exemption from the excise tax had been the most significant based on benefits claimed.[79] In 2004, however, Congress repealed the excise tax exemption, replacing it with two excise tax credits.[80]

The two new excise taxes credits are (1) the alcohol fuel mixture credit and (2) the biodiesel mixture credit. These credits can be claimed against the excise tax imposed on certain removals, entries and sales of taxable fuels.[81] An alcohol fuel mixture is any mixture of alcohol and a taxable fuel that is used by the producer or sold by the producer to any person for use as a fuel.[82] The credit amount varies depending on how much and what type of alcohol is contained in each gallon of fuel. For most fuel blends, the credit equates to 51 cents per gallon of alcohol used. A credit of 60 cents per gallon of alcohol is available for alcohol fuel blends that do not contain ethanol.[83] Alcohol derived from fossil fuels does not qualify for the exemption, and the alcohol must be at least 190-proof.[84] The biodiesel mixture is any blend of a biodiesel and diesel fuel (determined without regard to any use of kerosene) that is used by the producer or sold by the producer to any person for use as a fuel.[85] The credit amount varies depending on how much and what type of biodiesel is contained in each gallon of fuel. The credit for all of the biodiesel blends equates to 50 cents per gallon of biodiesel used. A credit of $1.00 per gallon of biodiesel is available for fuel blends that are considered agri-biodiesel.[86] These credits are to be coordinated with the income tax credits described below.

The three income tax credits: the alcohol mixtures credit, the pure alcohol fuel credit, and the small ethanol producers' credit, are aimed at distinct lines of business.[87] The alcohol mixtures –or blender's- credit is 52 cents per gallon of ethanol. The alcohol contained in any of these blends, referred to as gasohol, must be at least 190 proof.[88] The alcohol blender's credit is primarily available to petroleum refiner, distributor, or marketer who mixes ethanol with gasoline. Retail fuel sellers that sell pure ethanol as vehicle fuel or to use themselves in their business may take the pure alcohol fuel credit[89]

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[79] *See id.* at 2. Through 2000, Treasury estimated the revenue loss for the excise tax exemption to be $11,183,000,000 and the Joint Committee estimated it to be $7,523,000,000. While the revenue loss associated with the three income tax credits amounted to $478,000,000 (Treasury) and $198,000,000 (Joint Committee). *See* GAO REPORT 2000, *supra* note __, at 15, 17.

[80] *See* I.R.C. § 6426, added by the AMERICAN JOBS CREATION ACT OF 2004, Section 301(a).

[81] *See* I.R.C. § § 6426(b) and (c).

[82] *See* I.R.C. § 6426(b)(3).

[83] *See* I.R.C. § 6426(b)(2). The credit is available until December 31, 2010.

[84] *See* I.R.C. § 6426(b)(4).

[85] *See* I.R.C. § 6426(c)(3). This credit is available until December 31, 2008. *See* Explanation of the Energy Tax Act of 2005 at S-70. Biodiesel refers to a fuel blend made from vegetable oils and animal fats, combined with diesel.

[86] *See* I.R.C. § 6426(c)(2). Agri-biodiesel is derived solely from virgin oils, including esters derived from virgin vegetable oils, from corn, soybeans, sunflower seeds, cottonseeds, canola, crambe, rapeseeds, safflowers, flaxseeds, rice bran and mustard seeds and from animal fats. I.R.C. § 40A(d)(2).

[87] *See* I.R.C. §§ 38(b)(3), 40(a), and 87; GAO REPORT 2000, *supra* note __, at 18.

[88] *See* GAO, ALCOHOL FUELS TAX, *supra* note ___, at 35.

[89] *See* I.R.C. § 40(b)(2). If the alcohol proof is less than 190 but greater than 150, a reduced credit of 45 cents applies. I.R.C. § 40(b)(3).

also at a rate of 52 cents per gallon of ethanol.[90] The credit increases to 60 cents per gallon for alcohol fuel blends that contain biomass methanol or other biomass alcohols, instead of ethanol. A 10 cents-per-gallon credit is available for small producers whose production does not exceed 15 million gallons per year and whose production capacity does not exceed 60 million gallons per year.[91] These credits are scheduled to expire after December 31, 2010 and must be coordinated with the alcohol fuel mixture excise tax credit.

In 2004, Congress added another income tax credit – the biodiesel fuels credit, which consists of two combined credits: (1) the biodiesel mixture credit and (2) the biodiesel credit.[92] The biodiesel mixture credit is 50 cents per gallon of biodiesel used to produce a qualified biodiesel mixture as described under the excise tax credit.[93] The biodiesel credit is 50 cents for each gallon of biodiesel that is *not* mixed with diesel fuel and is used by the producer or sold by the producer at retail to any person for use as a fuel.[94] Both credits increase to $1.00 if agri-biodiesel is used. Biodiesel has gained popularity in recent years as less polluting than regular diesel fuels.

Again, in 2005, Congress added a new income tax credit and an excise tax credit for renewable diesel.[95] Renewable diesel is diesel fuel derived from biomass (excluding petroleum oil, natural gas, or coal) using a thermal depolymerization process. The credit amount is $1.00 per gallon. Producers of renewable diesel must register with the U.S. Secretary of the Treasury. Congress also added a new small agri-biodiesel producer credit.[96] A 10 cents-per-gallon credit is available for small agri-biodiesel producers up to 15 million gallons of production per year and whose production capacity does not exceed 60 million gallons per year.[97] This credit is scheduled to expire after December 31, 2008.

Tax Credits for Electric and Clean-Fuel Vehicles:

Congress considered tax measures to encourage the use of electric or alternative fuel vehicles on a number of occasions during the 1970s.[98] During the 1975 legislative session, in reaction to the 1973–1974 oil price shocks, Congress proposed a 25 percent

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[90] *See* I.R.C. § 40(b).

[91] *See* I.R.C. § 40(b)(4) (amended by Energy Tax Act of 2005); *See* Explanation of 2005 Energy Tax Act at S-78.

[92] *See* I.R.C. § 40A (added by the AMERICAN JOBS CREATION ACT OF 2004, Section 302 (a)).

[93] *See* I.R.C. § 40A(b)(1). The biodiesel mixture is any blend of a biodiesel and diesel fuel (determined without regard to any use of kerosene) that is used by the producer or sold by the producer to any person for use as a fuel.

[94] *See* I.R.C. § 40A(b)(2).

[95] Explanation of the 2005 Energy Tax Act at S-70 (amending I.R.C. §§ 40A, 6426, 6427).

[96] Explanation of the 2005 Energy Tax Act at S-70 (amending I.R.C. §§ 40A, 6426, 6427).

[97] *See* I.R.C. § 40(b)(4) (amended by Energy Tax Act of 2005); *see* Explanation of 2005 Energy Tax Act at S-78. The agri-biodiesel must (1) be sold by such producer to another person (a) for use by such other person in the production of a qualified biodiesel mixture in such person's trade or business or (b) for use by such other person as a fuel in a trade or business or (c) who sells such agri-biodiesel at retail to another person and places such ethanol in the fuel tank of such other person or (2) used by the producer for any of these listed purposes. (S-78).

[98] Between 1996 and 2002, alone, at least 27 different tax proposals were introduced in Congress to subsidize alternative vehicles. *See* Martin A. Sullivan, *The Car Credit: How a Tax break for Engineering Got Engineered*, TAX NOTES, Mar. 11, 2002, at 1248.

tax credit for persons who purchased a qualified electric highway vehicle costing less than $3,000.[99] Again in response to the 1979 oil price increases, the Senate passed a provision authorizing a 10 percent tax credit for the purchase of a qualifying electric vehicle or the conversion of an internal combustion engine to the use of electric power.[100] Both the 1975 and the 1979 efforts stalled, and Congress did not enact any electric vehicle credit. Thirteen years later in 1992, responding to the Persian Gulf War and Operation Desert Storm, Congress enacted a wide range of tax and nontax provisions to encourage domestic oil production develop alternative fuels and promote conservation.[101] The legislation included both the tax credit for vehicles powered by electric motors drawing current from either rechargeable batteries or fuel cells and immediate expensing of a portion of the costs of "qualified clean-fuel vehicle property" and "qualified clean-fuel vehicle refueling property."

Under current law, both electric and fuel cell vehicles are eligible for a 10 percent tax credit, up to a maximum of $4,000.[102] A qualified electric vehicle must be powered primarily by an electric motor drawing current from rechargeable batteries, fuels cells, or other portable sources of electrical current.[103] The credit is reduced by 75 percent in 2006, and completely eliminated by 2007.[104] Taxpayers can also deduct the costs of certain clean-fuel vehicles and clean-fuel refueling property.[105] Qualified clean-fuel vehicles include motor vehicles that use certain clean-burning fuels.[106] The maximum deduction is $50,000 for large trucks, vans or buses.[107] For mid-size vehicles, the maximum deduction is $5,000.[108] And for any other motor vehicle, the maximum deduction is $2,000. The deduction is reduced by 75 percent in 2006, and eliminated after December 31, 2006.[109] Purchasers of clean-fuel vehicle refueling property may also deduct up to $100,000 of the costs.[110] Clean-fuel vehicle refueling property includes property for the storage or dispensing of a clean-burning fuel or property for the on-site

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[99] *Id.* at 1246; ENERGY POLICY AND CONSERVATION ACT, Pub. L. No. 94-163, 89 Stat. 871 (1975).
[100] Sullivan, *supra* note __, at 1246.
[101] ENERGY SECURITY ACT OF 1992, Pub. L. No. 102-486, § 1913(b)(1) (1992).
[102] *See* I.R.C. §§ 30(a), 30(b). The credit is only available to the original property owner.
[103] *See* I.R.C. § 30(c).
[104] *See* I.R.C. § 30(b)(2); WORKING FAMILIES TAX ACT, *supra* note 67, at § 318(b); Sullivan, *supra* note 167, at 1246. Originally scheduled to phase out in 2004, the Working Families Tax Relief Act of 2004 again extended the provision through 2006. Despite the efforts of several groups, the IRS refused to extend the credit to include hybrid vehicles or existing cars retrofitted with electric engines. Sullivan, *supra* note 167, at 1246.
[105] *See* I.R.C. § 179A. The deduction is available for the year the property is placed in service. *Id.*
[106] *See* I.R.C. § 179A(c). Clean-burning fuels include natural gas, liquefied natural gas, liquefied petroleum gas, hydrogen, electricity and any other fuel containing at least 85 percent methanol, ethanol, any other alcohol or ether.
[107] I.R.C. § 179A(b)(1)(A). Trucks or vans with a gross vehicle weight over 26,000 and buses with at least a 20-person seating capacity.
[108] *Id.* A truck or van with a gross vehicle weight between 10,000 and 26,000 pounds.
[109] *See* I.R.C. § 179A(b)(1)(B), as amended by the Working Families Tax Act, § 319(b) (2004).
[110] *See* I.R.C. § 179A(b)(2). The deduction is available for the year the property is placed in service. *Id.* The deduction expires in 2006 and is replaced by a credit for 30 percent of the cost of the property. I.R.C. § 30C. This new credit is available through December 31, 2007.

recharging of electric vehicles.[111] The deduction for refueling property is one of the first incentives to address the need to support the infrastructure associated with these new technologies.

The 2005 Energy Tax Incentives Act added Alternative Technology Vehicle credits that will replace the current qualified clean fuel vehicle deduction after it expires.[112] A tax credit is created for qualified fuel cell vehicles, alternative fuel vehicles, qualified hybrid vehicles, advanced lean-burn technology motor vehicles, and alternative fuel refueling property. A qualifying fuel cell vehicle is a motor vehicle that is propelled by power derived from one or more cells that convert chemical energy directly into electricity through the use of a fuel cell. The amount of the credit is based on the weight class of the vehicle and the fuel economy of the vehicle.[113] Qualifying alternative fuel vehicles are vehicles that operate only on compressed natural gas, liquefied natural gas, liquefied petroleum gas, hydrogen, or any liquid that is at least 85 percent methanol. The credit for the vehicles is 50 percent of the incremental cost of the vehicle plus an additional 30 percent if the vehicle meets certain emissions standards.[114] A qualifying hybrid vehicle draws propulsion energy from on-board sources of stored energy that include both an internal combustion engine or heat engine using combustible fuel and a rechargeable energy storage system.[115] The amount of the credit depends on the weight of the vehicle, the fuel economy of the vehicle and the lifetime fuel savings of the vehicle. An advanced lean-burn technology vehicle incorporates direct injection, achieves at least 125 percent of the 2002 model year city fuel economy and other EPA standards. The credit is based on a combination of the fuel economy of the vehicle and the lifetime fuel savings of the vehicle.[116] These credits are scheduled to sunset on various dates between January 1, 2010 and January 1, 2015.

Energy Efficiency: The 2005 Energy Tax Incentives Act:

The 2005 Energy Tax Incentives Act also includes a number of tax incentives directed at energy efficient property. Moreover, for the first time since 1978, two of these tax incentives are available to individuals. Two new credits and a new deduction are available for businesses. A 30 percent business energy credit is available for the purchase of qualified fuel cell power plants for businesses. In addition, a 10 percent credit is available for the purchase of qualifying stationary micro-turbine power plants. The credit is nonrefundable and must reduce the taxpayer's basis in the property. The credit expires after December 31, 2007.[117] The second credit allows eligible contractors to take a tax credit for the construction of a qualified new energy-efficient home. To qualify, the home must be located in the United States, completed after date of enactment, and certified under certain standards that result in either a 30 or 50 percent

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[111] *See* I.R.C. § 179A(d). The storage or dispensing must occur where the fuel is delivered into the vehicle fuel tank.
[112] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-64, S-65.
[113] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-64, S-65 (adding new I.R.C. § 30B).
[114] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-65, S-66 (adding new I.R.C. § 30B).
[115] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-66 (adding new I.R.C. § 30B).
[116] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-66 (adding new I.R.C. § 30B).
[117] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-60 (amending I.R.C. § 48).

reduction in energy use. The credit is $1,000 for manufactured homes that meet the 30 percent test, and $2,000 for all new homes that meet the 50 percent test.[118] This credit expires after December 31, 2007. Third, businesses may deduct up to $1.80 per square foot of property for which energy-efficient commercial building property expenditures are made. Such expenditures include property (1) installed on or in any building located in the United States that meets certain defined standards, (2) which is installed as part of the interior lighting, the heating, cooling, ventilation, and hot water systems, and (3) which is certified as being installed as part of a plan to reduce energy and power costs based on certain standards. The provision expires on December 31, 2007.[119]

Two new tax credits are available for individuals if they invest in energy efficient property or energy efficient improvements to existing homes. A taxpayer may take a 10 percent credit for the purchase of qualified energy efficiency improvements to an existing home.[120] Qualified improvements include (1) insulation materials or systems, (2) exterior windows and doors, and (3) metal roofs, all of which are specifically designed to reduce heat loss or gain for a dwelling. The credit is also available for the purchase of (1) an advanced main air circulating fan, (2) a qualified natural gas, propane, or oil furnace or hot water boiler, or (3) other qualified energy-efficient property. The credit is limited to $500 in total across all taxable years, and no more than $200 of the credit may be for the cost of windows. The credit expires after December 31, 2007. A taxpayer may also take a 30 percent tax credit for the purchase of qualified photovoltaic property and qualified solar water heating property that is used exclusively for purposes other than heating swimming pools and hot tubs. The maximum credit for each of these systems is $2,000. An additional 30 percent credit is available for the purchase of qualified fuel cell power plants. The maximum credit for any fuel cell may not exceed $500 for each 0.5 kilowatt of capacity. Expenditures for labor costs for onsite preparation, assembly, or original installation are eligible expenses for the credit. The credit expires on December 31, 2007.[121]

With the explosion in environmentally-friendly tax incentives, evaluating their effectiveness is necessary to justify the government investment in these resources. This next section discusses the effectiveness of various energy tax incentives beginning with the early tax incentives used to encourage fossil fuel exploration and development. These early and long-standing tax incentives provide valuable insight into structuring tax measures that can accomplish their goal as well as lessons to be learned from those that have failed to achieve their desired result.

Part III. The U.S. Experience with Energy Tax Incentives.

Effect of Tax Benefits on the Fossil Fuel Industry in the United States:

The federal government's huge investment in the petroleum industry, through both tax and other government subsidies, have influenced how quickly and dramatically

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[118] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-73, 74 (adding new I.R.C. § 45L).
[119] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-71 (adding new I.R.C. § 179D).
[120] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-66 (adding new I.R.C. § 25C).
[121] *See* Explanation of the Energy Tax Incentives Act of 2005 at S-66 (adding new I.R.C. § 25D).

the U.S. developed into a fossil fuel driven society. Investment spurred development and consumption, resulting in exhaustion of the resource more quickly than might otherwise have occurred. In addition, other energy resources have not developed because of the inability to compete with the heavily-subsidized petroleum fuel industry. This section discusses the impact and effectiveness of energy-based tax incentives over a fairly long time period, and considers ways to use tax incentives to stimulate alternative fuels drawing on the history of fossil fuels.

For over 90 years, the combination of percentage depletion and the deduction for intangible drilling costs (along with more recently enacted tax incentives) has served to significantly lower the effective tax rate for companies in the oil and gas industry attracting substantial resources to the petroleum industry. For the petroleum industry, unlike other businesses, deductions for the costs of exploration and production are super-accelerated as compared to other types of capital investments – first, amounts in excess of original cost are deducted; second, most other costs associated with the investment are not only recoverable, but deductible immediately.[122] Since inception, the combination of percentage depletion and intangible drilling costs deductions has resulted in little or no income tax for much of the petroleum industry.[123] These generous tax incentives were designed to defer tax liability and encourage oil and gas prospecting, drilling and the development of U.S. petroleum reserves.[124] Since about 1934, nine years after Congress enacted percentage depletion, critics begin to characterize these deductions as tax "loopholes."[125] The U.S. President declared in 1937 that percentage depletion was "perhaps the most glaring loophole in our present revenue law."[126] For example, an early Treasury Department study indicated that percentage depletion reduced the taxable gross income of the petroleum industry as a whole by approximately 25.3 percent even taking into account the 50 percent net income limitation in place prior to 1990.[127] The study also revealed that percentage depletion exceeded cost depletion by approximately 95.7 percent of the total depletion allowable.[128] Other studies show that intangible drilling costs account for 75 to 90 percent of the costs of drilling.[129] A nationwide survey taken between 1948 and 1955 indicated that IDCs averaged slightly less than 70 percent of total gross income from production.[130] Therefore, the IDC deduction alone appears to have

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[122] *See* MCDONALD, *supra* note ____, at 16.
[123] *See id.* at 26; GAO, QUESTIONABLE MERIT, *supra* note __, at 51; Lazzari, 2005 Report, at Summary.
[124] Lazzari, 2005 Report at 2.
[125] Blaise, at 395.
[126] Blaise, at 396.
[127] *See* MCDONALD, *supra* note ____, at 17; U.S. TREASURY DEPARTMENT , OFFICE OF TAX ANALYSIS, STATISTICS OF CORPORATION MINERAL DEPLETION DEDUCTIONS AND RELATED ALLOWANCES, 1950, 1951, 1952 at 29, 37-40 (1955); s*ee* John H. Shows, *The Oil and Gas Industry and Its Present Tax Treatment,* 45 MISS. L. REV. 1125, 1128 (1974).
[128] *See* MCDONALD, *supra* note ____, at 17; U.S. TREASURY DEPARTMENT , OFFICE OF TAX ANALYSIS, STATISTICS OF CORPORATION MINERAL DEPLETION DEDUCTIONS AND RELATED ALLOWANCES, 1950, 1951, 1952 29, 37-40 (1955).
[129] GAO, QUESTIONABLE MERIT, *supra* note, at 24; ANDREW KIMBRELL, ET. AL, THE REAL PRICE OF GASOLINE: ANALYSIS OF THE HIDDEN EXTERNAL COSTS CONSUMERS PAY TO FUEL THEIR AUTOMOBILES 11 (1998).
[130] *See* MCDONALD, *supra* note __, at 18 (citing data from Mid-Continent Oil and Gas Association, Percentage Depletion, Economic Progress, and National Security 34 (1961)).

had the effect of reducing the marginal tax rate by more than half. Another study of tax return data using samples from leading corporations in selected industries for the period between 1938 and 1961, indicated that oil and gas producers earned higher rates of return than integrated petroleum companies, manufacturing companies, mining companies and all industry, with a rate of return for oil and gas producers ranging from 3 to 22 percentage points higher. [131] After 1969, when Congress reduced the percentage depletion rate to 22 percent, one report estimated that the combination of the percentage depletion and IDC deductions reduced the total tax liability for petroleum and oil producers by approximately 46 percent, 6 1/2 times higher than the maximum rate applicable to the general business credit available at the time.[132] Throughout the 1980s and 1990s, tax rates for oil and gas producers continued to be lower when compared to other industries.[133]

The increased profitability and reduced marginal tax rates of the petroleum industry reduced production costs, increased investments in petroleum exploration, accelerated oil and gas extraction, and caused depletion of energy resources more rapidly than would otherwise have occurred.[134] "Relatively low oil prices encouraged petroleum consumption (as opposed to conservation) and inhibited the development of alternatives to fossil fuels, such as unconventional fuels and renewable forms of energy."[135] One relatively early study analyzing resource allocation, covering 1959 to 1971, concluded that federal tax policies significantly affected investment in crude petroleum reserves.[136] The study also indicated that the percentage depletion allowance was not cost-effective in increasing reserves when compared to the alternative policy of having the government

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[131] *See id.* at 142 (citing data compiled by the First National City Bank of New York). In another sample of corporate tax returns for the years 1949-1956, the average rate of return on stockholder's equity for oil and gas producers was 24.2 percent versus 12 percent for manufacturing corporations. *See id.* (citing data compiled in an earlier study analyzed by the author, Stephen L. McDonald, *Percentage Depletion and the Allocation of Resources: The Case of Oil and Gas*, 15 NATIONAL TAX JOURNAL 323, at 333-336 (December 1961)).

[132] *See* Gerald M. Brannon, *Existing Tax Differentials and Subsidies Relating to the Energy Industries*, *in* STUDIES IN ENERGY TAX POLICY**,** at 8-11 (Brannon, ed. 1975). The percentage depletion deduction resulted in an exemption of about 15 percent of gross income or the equivalent of 33 percent tax reduction. The same report estimated that the IDC deduction shaved off another 15-18 percent of the total tax liability.

[133] GAO, QUESTIONABLE MERIT, *supra* note__**,** at 56. In the mid-1980s, the GAO reported that the marginal tax rate for independent oil and gas producers ranged from 8 to 9 percent and for integrated oil and gas from 7 to 24 percent. For most other industries the marginal tax rate ranged from 31-32 percent. More recent data, from 1994, indicates that the tax rate differential persists despite reductions in both percentage depletion and, in some cases, IDCs. *See* JENNY B. WAHL, OIL SLICKERS: HOW PETROLEUM BENEFITS AT THE TAXPAYER'S EXPENSE 3 (Institute for Local Self-Reliance 1996), http://www.ilsr.org.. The Congressional Research Service found an effective tax rate on oil and gas extraction income of 11 percent, as compared to the statutory rate for corporations of 35 percent. *See* JANE GRAVELLE, ECONOMIC EFFECTS OF TAXING CAPITAL INCOME 54 (MIT Press 1994). In a 1995 report, the Union of Concerned Scientists also calculated the effective tax rate for the oil and gas industry at 11 percent as compared to an effective rate for non-oil industry companies of 18 percent. *See* KIMBRELL, *supra* note, at 10; ROLAND HWANG, MONEY DOWN THE PIPELINE: UNCOVERING THE HIDDEN SUBSIDIES TO THE OIL INDUSTRY, at Executive Summary 1 (Union of Concerned Scientists 1995).

[134] *See* Lazzari Economic Analysis, supra note --, at Summary.

[135] Lazzari, 2005 Report at 2.

[136] *See* Cox, *supra* note__, at 186, 192.

purchase additional oil reserves directly.[137] The effect of these tax benefits can be directly related to increased consumption. Several recent reports have quantified the tax benefits to the petroleum industry as reflected through lower gasoline prices to consumers.[138] These estimates conclude that tax subsidies reduce the price of gasoline by 1½ cents per gallon (on the low range) to 7 cents per gallon (on the high range).[139] Lower prices translate into additional consumption (rather than conservation) of gasoline by consumers. Because energy policy is made in a political setting, it rarely comports with principles of economic or public finance theory, and "more often than not, energy tax policy may compound existing distortions, rather than correct them.[140] In 1920, oil and gas production comprised 16 percent of total U.S. energy production. By 1970 (the peak production year in the U.S.), petroleum production constituted 71 percent of total U.S. energy production.[141]

Policymakers have justified the differential tax treatment of the petroleum industry on several grounds: (1) to adjust for the high risk associated with the oil and gas industry and encourage investors to provide the significant up-front capital needed to develop this valuable commodity; (2) to encourage conservation of the oil and gas reserves and prevent wasting our limited oil reserves; and (3) to maintain our productive capacity in oil reserves for national defense purposes.[142] While other reasons for preferential tax treatment are also advanced, throughout their long history, these are most often used justify percentage depletion and the IDC deductions.[143]

Preferential tax treatment is often provided to industries that are risky.[144] Without a subsidy, or so the argument goes, the tax system may discourage investment in activities that involve high risk and the possibility of substantial losses.[145] In certain circumstances, "lower tax rates for the more risky industries may be consistent with an optimum allocation of productive resources."[146] Moreover, investors in high-risk activities require higher investment returns, and taxes can make that harder to achieve.[147] Because of the social benefits of inexpensive petroleum (ignoring costs such as pollution), the government has provided tax incentives that reduce, or eliminate, the effect of a tax on the oil and gas industry.[148] Furthermore, one commentator noted that tax incentives for oil and gas also indicate the government's approval of the industry and its daring and self-reliant image.[149] Because the government (or society) favors such values, then it is also more likely that in assessing the costs and benefits of a particular

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[137] *Id.* at 192.
[138] *See* WAHL, *supra* note____, at 1; KIMBRELL, *supra* note ___, at 10-14.
[139] *See* WAHL, *supra* note ___, at 1; KIMBRELL, *supra* note __, at 10-14
[140] Lazzari, 2005 Report at 1.
[141] Lazzari, 2005 Report at 2.
[142] *See* MCDONALD *supra* note ___, at 2.
[143] *See* MCDONALD *supra* note ___, at 2; GAO, QUESTIONABLE MERIT, *supra* note ___, at 44.
[144] *See* GAO QUESTIONABLE MERIT, *supra* note ___, at 44.
[145] *See* Livingston, *supra* note ___, at 171.
[146] *See* McDonald, *supra* note __, at 49.
[147] *See* Livingston, *supra* note __, at 171
[148] *See* GAO QUESTIONABLE MERIT, *supra* note ___, at 5.
[149] *See* Livingston, *supra* note __, at 185. Because of the technology involved in the industry, it also is viewed as scientific – another image to which Americans are drawn. *Id.*

risk, the benefits will be emphasized over the risks, and the result will make tax incentives (or other subsidies) more likely.

During the 1950s and 1960s, a number of prominent tax economists studied the impact of risk in the oil and gas industry and whether federal tax incentives were necessary to adjust for the risk associated with the petroleum industry relative to other industries.[150] Several of these economists concluded that the percentage depletion and IDC deductions resulted in a misallocation of resources toward the petroleum industry.[151] Other economists contended that, depending on the choice of assumptions and data, preferential tax treatment was necessary to overcome inordinate risk associated with petroleum exploration and development.[152] Unfortunately, because of the difficulty in breaking down the factual data and determining the incidence of the corporate tax, these studies were unable to provide definitive conclusions. In a more recent report, the Congressional Research Service concluded that stabilizing oil prices, perhaps with a variable oil import tax, would address market risk more effectively than tax subsidies.[153] Thus, when risk is evaluated, studies indicate that the case for oil and gas tax incentives is not clear.[154]

In one recent example, Congress enacted a nonconventional fuels tax credit, to encourage production of fossil fuel from marginal sources.[155] A recent study indicated that the impact of this credit *would* increase oil and gas production from qualified sources. However, the credit will have no impact on reducing our dependence on fossil fuels or foreign imports.[156] In another example, Congress suspended the 100 percent net income limitation for taxpayers deducting percentage depletion on marginal oil and gas production beginning in 1998.[157] Prior to this change, the percentage depletion deduction could not exceed 100 percent of the net income from the oil and gas property.[158] The impact of this change is to permit taxpayers to use percentage depletion deductions to

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[150] *See* McDonald, at 49-64; Arnold C. Harberger, The Taxation of Mineral Industries, Federal Tax Policy for Economic Growth and Stability, at 439-49, Joint Committee on the Economic Report, 84 Cong. 1st Sess. (1955); Peter O. Steiner, Percentage Depletion and Resource Allocation, Tax Revision Compendium, Committee on Ways and Means, 949-966 (Nov. 16, 1959); Stephen L. McDonald, *Percentage Depletion and the Allocation of Resources: The Case of Oil and Gas*, NATIONAL TAX JOURNAL 323, 329-36 (Dec. 1961); Richard A. Musgrave, Another Look at Depletion, 15 National Tax Journal 205 (June 1962).

[151] *See* Richard A. Musgrave, The Theory of Public Finance, chapter 14 (1959); Richard A. Musgrave, Another Look at Depletion, 15 National Tax Journal 205 (June 1962); Arnold C. Harberger, The Corporate Income Tax: An Empirical Appraisal, Tax Revision Compendium, Committee on Ways and Means, 231-235 (Nov. 16, 1959); Arnold C. Harberger, The Taxation of Mineral Industries, Federal Tax Policy for Economic Growth and Stability, at 439-49, Joint Committee on the Economic Report, 84 Cong. 1st Sess. (1955).

[152] *See* McDonald, at 64.

[153] *See* Lazzari Economic Analysis, supra note – at 13.

[154] *See* Livingston, *supra* note __, at 185; MCDONALD, *supra* note __, at 64; Brannon, *supra* note ___, at xvi, 66-71.

[155] Originally enacted as I.R.C. § 29, the credit is now codified at I.R.C. § 45K.

[156] *See* EIA, Analysis of Five Selected Tax Provisions of the Conference Energy Bill of 2003, at 2 (February 2004).

[157] *See* Joint Committee on Taxation, Description and Analysis of Certain Federal Tax Provisions Expiring in 2005 and 2006 at 63 (March 11, 2005)(JCX-12-05). See also WORKING FAMILIES TAX ACT, *supra* note 67, at § 314(a) (2004) (amending Code § 613A (c)(6)(H)).

[158] I.R.C. 613(a); 613A(c)(6)(H)(suspending the net income limitation through December 31, 2006).

offset taxable income unrelated to oil and gas production.[159] Congress originally suspended the limitation to prevent owners from plugging wells when the price of oil dropped to unexpectedly low levels – at that time, oil averaged $10.87 per barrel.[160] In light of the price of oil today, this incentive is completely unjustified.

As to the other two justifications for oil and gas incentives, conservation and national security, tax subsidies have not served these purposes. Neither percentage depletion nor the IDC deduction has encouraged conservation of the oil and gas reserve, nor have they increased U.S. security interests associated with foreign imports.[161] Because petroleum is a nonrenewable wasting asset, conservation (or the avoidance of waste) depends on the rate of use of known mineral reserves and the rate of discovering new reserves. Lowering the costs of petroleum consumption (i.e., through tax incentives) has had the effect of encouraging waste, not conservation.[162] In terms of national security, domestic production of petroleum increases national security (1) by reducing foreign imports of petroleum leaving the U.S. vulnerable to foreign governments, (2) by contributing to the creation and maintenance of a domestic reserve in times of energy shortages, and (3) by producing enough reserves, such that a large volume of petroleum could be diverted for military use and war production without creating a civilian energy crisis.[163] However, the GAO concluded that "developing alternatives, increasing fuel efficiency in transportation, and continuing the development of the Strategic Petroleum Reserve" would likely increase U.S. energy security more than additional oil and gas tax incentives.[164] Although alternative and renewable fuels have the potential to increase petroleum conservation and alleviate national security concerns, to date, they are not used enough to have much impact on increasing the supply of oil reserves or reducing dependence on foreign imports.[165]

Since the inception of the percentage depletion allowance and the IDC deduction, the United States has spent between $370 and $391 billion (in 2004 dollars) through tax incentives to subsidize fossil fuels.[166] This results in an average expenditure of approximately $4.5 billion every year for the last 87 years.[167] Furthermore, these

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[159] JCT Report on expiring provisions at 65.

[160] JCT Report on expiring provisions at 64, citing S. Rpt. No. 105-33. This same rationale was cited in the 1999 extension of this provision. See S. Rpt. 106-201, at 12.

[161] *See* GAO, QUESTIONABLE MERIT, *supra* note __ , at 39.

[162] *See* McDonald, at 76.

[163] *See* McDonald, at 85.

[164] *See id.* at 4; GAO, QUESTIONABLE MERIT, *supra* note __, at .

[165] *See* GAO, ALCOHOL FUELS TAX, *supra* note __, at 6.

[166] *See* Table 1 in Appendix.

[167] A number of other studies have come up with similar results for the annual amount, but no other study has estimated the cumulative investment amount. *See* Koplow and Dernback, *supra* note __, at 366. All of the reports are stated in 1999 dollars. EIA Report (1999-2000) estimated $2.6-2.9 billion per year. MISI Report estimated $6.81 billion per year. ICTA estimated $8.4-$15.8 billion per year. Koplow/Martin estimated $3.9-$6.8 billion per year. Wahl report estimated $3.5-$11.4 billion per year. Hwang Report estimated $3.6-4.1 billion per year. Koplow Report estimated $14.3-23.8 billion per year. EIA Report (1992) estimated $3.7-$4.3 billion per year. Heede Report estimated $38.8 billion per year. Pacific Northwest Laboratories (for Department of Energy) estimated $8.0 billion per year. *Id.* The estimates for the tables in this article come from the Joint Committee Report, the General Accounting Office estimates, and the Pacific Northwest Laboratories Report and from figures derived using the methodology established in the PNL report for fossil fuel incentive from 1918-1949.

amounts represent the tax expenditure figure only, and do not include subsidies that directly and indirectly benefit the oil and gas industry or other externalities that are more difficult to measure. For example, the government subsidizes the transportation infrastructure, energy security costs, research and development subsidies, and costs associated with maintaining the Strategic Petroleum Reserve. Externalities that flow from fossil fuel use and the car, such as localized pollution including air pollution; agricultural crop losses and loss of visibility; planet-wide environmental costs such as global warming; water pollution costs such as oil spills; noise pollution; the environmental impact of sprawl, travel delays and subsidized parking, just to name a few, cost Americans in both money and the quality of life.[168] When the economic models consider, not only subsidy reform, but also programs conferring benefits to fossil fuels, the measurable impact of the reforms is substantially increased.[169] One report states that these other non-tax programs contributed nearly 30 percent of the total subsidy-related costs.[170] All the while, environmental concerns are multiplying by geometric proportions. Perpetuating the fossil fuel lifestyle (and fossil fuel subsidies) is not the answer – fossil fuel use in today's proportions is just not sustainable over the long term.

Effect of Tax Benefits on the Alternative/Renewable Fuel Industry:

The U.S. government could encourage taxpayers to decrease their dependence on fossil fuels by facilitating the development of alternative fuels and renewable fuels and encouraging greater efficiency when non-renewable energy sources are used.[171] Currently, none of these options alone can make a significant impact on reducing fossil fuel use. Together, however, these strategies can be effective. Increased commercial availability and reduced cost are necessary for widespread use and acceptance to take hold. This section considers the role of tax incentives in achieving this goal.

Until renewable fuels are more commercially viable, alternative fuels which combine fossil fuels with a renewable fuel provide a technologically feasible option to fossil fuel use. Unfortunately, while alternatives have the potential to reduce fossil fuel use, fossil fuels are still required. As a result, these "environmentally-friendly" tax subsidies that purport to encourage fossil fuel alternatives encourage continued dependence on fossil fuels. In the long run, alternative fuels should be phased out as renewable fuels become more viable. The most significant alternative fuel tax provision, the credit or deduction for alcohol fuels (which constitutes over 94% of alternative tax incentives directed at reducing gasoline use),[172] grants a subsidy to fossil fuels mixed

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[168] ICTA Report, *supra* note.

[169] *See* Koplow and Dernbach, *supra* note at 373.

[170] *Id.* (These programs include tax exempt municipal bonds, subsidies to federal power marketing administrations, Rural Utility subsidies, energy share of full user fee financing of water infrastructure, and user fee financing for the Strategic Petroleum Reserve.)

[171] Kenneth Gillingham, Richard Newell, Karen Palmer, The Effectiveness and Cost of Energy Efficiency Programs, Resources 22 (Fall 2004).

[172] This figure is based on the Joint Committee on Taxation's Tax Expenditure Analysis. Estimates of the federal excise tax exemption for alcohol fuels are included in these figures, but no offset is provided for the "gas guzzler" tax.

with an alternative fuel, typically alcohol or ethanol.[173] Thus, while the incentive may encourage more efficient fossil-fuel consumption, alternative fuel use has not resulted in lower fossil fuel consumption or reduced our dependence on the car.[174] In fact, both consumption and car use have increased despite these provisions. Since 1978 when Congress enacted most of the alternative fuel provisions, the United States has invested between $30 and $33 billion dollars in alternatives through tax subsidies. During this same period, despite decreases in oil and gas incentives, the United States invested approximately $106 billion in fossil fuels – three times what it spent on alternatives fuels.[175] This kind of differential, not surprisingly, undercuts the likelihood of achieving successful results for alternatives fuel technologies. To date, the tax subsidies for alternative fuels are too small and fail to target the real problem - fossil fuel dependence.

Alternative fuels do have the potential to reduce petroleum consumption, reduce greenhouse gas emissions and produce significant energy savings. Under a long-term strategy, moving to alternative fuels represents an intermediate step in the right direction. Unfortunately, several recent studies indicate that even with increasing purchases of alternative fuel vehicles by federal agencies, state governments, and private consumers, "alternative fuel use in the transportation sector remains very small."[176] These reports conclude that several critical factors hinder the public's acquisition of alternative fuel vehicles and the use of alternative fuels. To begin with, the price of gasoline has not been high enough to convince Americans to give up their conventional fuel vehicles in favor of alternatives. Despite significant crude oil price increases, gasoline prices are still relatively low.[177] In addition, the United States has developed a massive refueling infrastructure and car-manufacturing system dedicated to gasoline-powered autos.[178] As a result, even if the price of gasoline rises substantially, many car owners will be reluctant to switch technologies because of the added inconvenience.

Moreover, compared to the refueling infrastructure developed around the gas-powered car, the limited number of refueling stations for alternative fuels makes their use extremely inconvenient for the average consumer.[179] In 2004, a little over 6,000 refueling station provided alternative fuels in the United States compared with over 180,000 conventional gas stations. One report states the "lack of adequate refueling

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[173] *See supra* text accompanying notes __ to __ for a detailed explanation the various tax provisions.

[174] *See* GAO, ALCOHOL FUELS TAX, *supra* note __, at 2, 6.

[175] *See* Appendix for total CPI adjusted fossil fuel expenditures. This figure is the sum for 1979 to 2004.

[176] *See* GAO IMPACT, *supra* note

[177] The price of crude oil is approximately $37.00 per barrel and the average price of gasoline is $1.54. *See* Myra P. Saefong, *Oil Up for the Day, Down for the Month: Gasoline, Natural Gas Prices Higher, but Grain Futures Fall*, CBS Market Watch (June 30, 2004) – there is no cite, so want to make sure this is the correct citation. The price of gasoline remains low compared to historical prices that are adjusted for inflation. For example, the price of gasoline in 1981 was $1.35 per gallon. Adjusted for inflation, today's equivalent would be $2.81 in 2004.

[178] *See* GAO IMPACT, *supra* note __, at 4. Since 1992, the Code offers taxpayers acquiring clean fuel refueling property a deduction up to $100,000 of the cost of the property. I.R.C. § 179A(b)(2). This deduction will be replaced in 2007 with a tax credit equal to 30 percent of the cost of the property. I.R.C. § 30C. This type of provision helps in the development of the infrastructure supporting alternative fuel technologies.

[179] *See id.*

infrastructure represents the biggest impediment to using alternative fuel vehicles."[180] Finally, alternative fuel vehicles are, on average, more expensive that conventional cars. For example, the price of an electric powered vehicle ranges from the low $30,000s to the mid-$40,000.[181] The high cost reduces consumer demand. It's not surprising that the GAO concluded in one study that very large tax incentive would be needed to result in any significant increase in alternative fuel vehicles.[182]

Similar to the petroleum industry, the significant risks involved with entry into the alternative fuel market could justify the current tax incentives. Studies evaluating the effectiveness of tax incentives for alternative or renewable fuel technologies indicate subsidies have been necessary to the development of this industry. Entering into the energy industry with its deeply entrenched infrastructure presents potential investors with difficult barriers. In fact, without the federal tax incentives to keep its price competitive with conventional fuels, no market would exist for alcohol fuels, and thus, no capital.[183] The federal tax incentives were instrumental in overcoming the risk factor and establishing this industry.[184] Thus, tax incentives (or other incentives) are necessary to the development of alternatives. The reason is basically the same as it was 100 years ago for using incentives to stimulate the petroleum industry: (1) to overcome the high initial start-up costs; (2) to minimize the high risk associated with new industries; and (3) to signal to taxpayers support for these industries.

In 1978, when the first tax incentives encourage environmental activities were enacted, Congress included wind power and solar power among those technologies it wanted to encourage.[185] As renewable energy sources, wind and solar have little or no negative impact on the environment. Furthermore, as the United States increases its use of renewable energy, energy security will be improved. Studies confirm that significant energy and financial savings result from improving the renewable energy industries relative to more traditional energy sources. After 1992, when Congress enacted the production tax credit (PTC) to encourage the production of electricity from wind, the wind industry took off, and the United States quickly became the world leader in the development of wind technologies.[186] At the time of enactment, Congress indicated that the credit was "intended to enhance the development of technology to utilize the specified renewable energy sources and to promote competition between renewable

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[180] *See id.*

[181] *Id.* at 5. The three commercially available hybrids: the Toyota Prius, the Honda Insight, and the hybrid version of the Honda Civic have 30 to 40 percent higher fuel efficiency, but cost $3,000 to $4,000 more than comparable conventional vehicles. *See* DAVID L. GREENE AND ANDREAS SCHAFER, REDUCING GREENHOUSE GAS EMISSIONS FROM U.S. TRANSPORTATION (PEW CENTER ON GLOBAL CLIMATE CHANGE 17 (May 2003) – want to make sure this is correct type of periodical.

[182] *See* GAO IMPACT, *supra* note __, at 4.

[183] *See* GAO IMPACT, *supra* note __, at 12.

[184] *See* GREENE, *supra* note __, at 48.

[185] National Association of State PIRGs, Achieving a New Energy Future, How States Can Lead America to a Clean, Sustainable Economy at 10 (August 2005).

[186] Since 1993, the annual electricity production from wind has more than quadrupled. *See* Joint Committee on Taxation, Present Law and Background Relating to Tax Credits for Electricity Production from Renewable Sources, at __ (May 19, 2005) (JCX-36-05).

energy sources and conventional energy sources."[187] In large part due to Congress' failure to make the production tax credit permanent and to adopt renewable production standards,[188] the U.S. has fallen behind, while other countries have recognized the immense benefits from this renewable energy source. The American Wind Energy Association notes that "The PTC, a key incentive, helps level the economic playing field for wind projects in energy markets where other forms of energy are also subsidized….[H]owever, . . . the current "on-again, off-again" status of the credit is hobbling project development and the industry as a whole. . . . One major developer stated that a five year extension of the PTC would provide enough long-term certainty to squeeze an additional 25 percent out of vendor costs."[189] Unfortunately, Congress only extended the provision for two years in the 2005 legislation.[190]

Since the Reagan era, all of the energy tax legislation enacted by Congress, with modest incentives for conservation and alternative fuels, has continued to provide tax relief for the oil and gas industry.[191] For example, in the most recent 2005 Energy Tax Act legislation, fossil fuels subsidies accounted for more than two-thirds of the total tax expenditures provisions for energy.[192] The various tax incentives available for conservation and renewable technologies represent a small fraction when compared with the U.S.'s enormous investment in fossil fuels and its infrastructure. Yet, the potential for improved energy efficiency in the United States is immense.[193] One report states that with existing cost-effective energy efficiency improvements, electricity demand can be reduced by 11 to 23 percent below projected levels for 2010, and possibly up to 35

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[187] *See* Joint Committee on Taxation, Present Law and Background Relating to Tax Credits for Electricity Production from Renewable Sources, at __ (May 19, 2005) (JCX-36-05).

[188] Many groups interested in increasing the U.S. renewable energy use have advocated the adoption of a national renewable energy standard (RPS). In 2005, the Senate version of the Energy Policy Act of 2005 included a provision that would have required all large electric utilities to gradually increase their use of wind, solar, and other renewable energy sources to at least 10 percent by 2020. This provision was modeled after similar standards that already exist in 20 states and would have reduced natural gas and electricity prices and provided significant economic and environmental benefits according to a number of studies. Unfortunately, the Conference Committee dropped the provision. *See* Union of Concerned Scientists, Renewing America's Economy (July 2005)(http:www.ucsusa.org). Another study compared the cost effectiveness of both the RPS and the PTC found that while both were effective in increasing the share of renewable electricity, the RPS was more cost effective and produced a greater environmental benefit. *See* Karen Palmer and Dallas Burtraw, Electricity, Renewables, and Climate Change: Searching For a Cost Effective Policy, Resources for the Future at 6 (May 2004)(http://www.rff.org).

[189] American Wind Energy Association, The Economics of Wind at 4 (February 2005)(www.awea.org/pubs/factsheets/EconomicsofWind-Feb2005.pdf).

[190] In addition to the uncertainty connected to the sunsetting of this credit, the Joint Committee notes the lack of uniformity in the value of the credit depending on the geographic location of the facility. The Committee notes "With the tax credit equal for all taxpayers and because qualifying renewable energy sources are not uniformly available at equal cost, the credit is more valuable to investors in certain facilities in certain geographic locations, than for investors with similar facilities in other geographic locations." As a result, the credit operates inefficiently by providing an equal credit to all facilities regardless profitability in the absence of the subsidy. *See* Joint Committee on Taxation, Present Law and Background Relating to Tax Credits for Electricity Production from Renewable Sources, at __ (May 19, 2005) (JCX-36-05).

[191] *See* Lazzari, *supra* note__, at 8.

[192] *See* Lazzari, *supra* note__, at 16.

[193] Energy efficiency goes up when car engines or household appliances, for example, are redesigned in a way that enables them to provide the same use with less energy. See Sissine, at CRS-1 (6/17/05).

percent by 2020.[194] In fact, data on energy efficiency and conservation activities from 1973-1991 revealed an 18 percent reduction in energy use from previous projections saving about $150 billion annually in total U.S. energy expenditures.[195] In terms of environmental quality, one study estimated that by implementing a number of recent proposed conservation programs (Energy Policy Act of 2005 includes only a few policies), annual carbon emissions would be reduced by about 3.5 percent and nontransportation energy consumption would be reduced by about 6 percent.[196] Energy efficiency policies, which address the demand side of the energy equation, are an inexpensive means to address climate change. The energy savings alone typically covers the cost.

Tax incentives can help increase the market for new energy efficient products by reducing their cost and lowering the risk of production for manufacturers.[197] As a result of tax incentives, the public benefits from lower energy use, environmental quality improvements, and enhanced energy security.[198] One study estimated that tax incentives for new energy efficient homes, energy efficient upgrades to existing homes, and energy efficient upgrades to new and existing commercial buildings could save 11 quadrillion btu's of energy through 2025 and will save consumers over $88 billion dollars during the same period.[199] Under the 2005 Energy Tax Incentive Act, the government will spend significantly less on the tax incentives included than the cost savings involved, ignoring the cost savings from environmental quality improvements.[200] Moreover, tax deductions and credit for energy conservation can significantly increase the likelihood that individuals and businesses will invest in these technologies.[201] To the extent that policy makers are able to identify incentives that encourage "green" behavior and result in both environmental and monetary savings, Congress must be more proactive in adopting such incentives.

Part IV: Development of Cost-Effective Tax Incentives for the Emerging U.S. Alternative Energy Market

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[194] National Association of State PIRGs, Achieving a New Energy Future, at 9 (Aug. 2005).

[195] *See* Fred Sissine, CRS Issue Brief for Congress, Energy Efficiency: Budget, Oil Conservation, and Electricity Conservation Issues, at 3 (June 17, 2005).

[196] Kenneth Gillingham, Richard Newell, Karen Palmer, The Effectiveness and Cost of Energy Efficiency Programs, Resources 24 (Fall 2004).

[197] Alliance to Save Energy, Fact Sheet: Energy Efficiency Tax Incentives (May 2005). The estimates are based on information from the American Council for an Energy Efficient Economy.

[198] Kenneth Gillingham, Richard Newell, Karen Palmer, The Effectiveness and Cost of Energy Efficiency Programs, Resources 22 (Fall 2004).

[199] Alliance to Save Energy, Fact Sheet: Energy Efficiency Tax Incentives (May 2005). Total annual energy consumption in the U.S. is 100 Quadrillion btu. In addition, the information provided in the report does not provide enough information to determine whether the new tax incentives contained all of the features advocated by the Alliance to Save Energy.

[200] Patrick Quinlan, Howard Geller, and Steven Nadel, Tax Incentives for Innovative Energy-Efficient Technologies (Updated) at ix, x (October 2001) (ACEEE Report Number E013)(http://www.aceee.org).

[201] Kenneth Gillingham, Richard Newell, Karen Palmer, Retrospective Examination of Demand-Side Energy Efficiency Policies, Resources for the Future 35 (June 2004, revised Sept. 2004)(discussion Paper 04-19 rev).

Despite rhetoric regarding the development, implementation and commitment to overcoming our devastating oil habit – the numbers tell the truth. To date, Americans have only dabbled in alternatives. Tax incentives enacted to encourage alternative fuels are too small and do little to change the infrastructure that supports nonrenewable fuels. Put simply, they are insignificant and fail to address the real problem – dependence on fossil fuels. On the other hand, the same tax incentives that subsidized fossil fuels fifty years ago still do so today. These provisions, by and large, have been ineffective in solving any of the problems associated with fossil fuel dependence. While Congress has limited fossil fuel subsidies somewhat over the years and enacted a few "environmentally-friendly" tax subsidies since the 1970s, policymakers, hampered by politics, are slow in formulating a long-range plan for dealing with fossil fuel dependence – through tax policy or elsewhere. Policymakers must focuses on identifying features of the various tax incentives that correlate positively with the goal of stimulating technology, investment and public acceptance for renewable energy sources, energy conservation, and increased efficiency of traditional energy technologies.

Tax incentives, if properly structured, can play a valuable role in moving the U.S. towards a sustainable energy future. A detailed analysis of the effectiveness of energy tax incentives reveals a number of guiding principles to be used in formulating tax incentives promoting alternative energy sources.[202] For example, tax incentives should promote the commercialization of advanced technologies.[203] Incentives should facilitate new technologies, not existing ones, establish themselves in the marketplace. Such incentives should also target those technologies that will have the most significant impact in reducing energy use and green house gas emissions. Such incentives must be substantial in the initial stages of the subsidy in order to overcome barriers to entry into the market. Concomitantly, tax incentives should target technologies where the initial cost is the major barrier. Governments also need to be flexible in terms of who receives incentives and allow adequate time before phasing them out. Finally, tax incentives need to be part of a mix of policy initiatives and work in complementary fashion with other strategies. One recent study evaluated the various factors that influenced firms to adopt new technologies -- specifically, environmental innovations.[204] The study concludes that financial incentives must be relatively high in amount and in place long enough to encourage a switch in technology.

The Energy Tax Incentives Act of 2005 includes some successes and some disappointments based on these criteria. First, the vast majority of tax incentives will expire at the end of 2007.[205] To be most effective, most economists suggest that the incentive be in place for at least a 10 year period.[206] Because these new incentives will expire so soon, individuals and businesses that might have utilized the credits may not even know they are available before it's too late. Even taxpayers interested in investing

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[202] Patrick Quinlan, Howard Geller, and Steven Nadel, Tax Incentives for Innovative Energy-Efficient Technologies (Updated) at 2 (October 2001) (ACEEE Report Number E013)(http://www.aceee.org).
[203] Id. at 2.
[204] Malloy and Sinsheimer, *Innovation, Regulation and the Selection Environment*, 57 Rutgers, L.Rev. 183 (2004).
[205] Steven Nadel, The Federal Energy Policy Act of 2005 and its Implications for Energy Efficiency Program Efforts, at ii (ACEEE Report E053, September 2005).
[206] Quinlan, supra note --, at 3.

in new technologies subject to the incentives may have difficulty finding them in the market. In addition, some of the most cost-efficient and energy efficient tax credits did not get enacted. For example, a ten percent credit for Combined Heat and Power Systems, which has an estimated benefit-cost ratio of 3 to 1 and an energy savings per dollar spent of 29 million btu to one.[207] On the other hand, in exchange for the two billion dollars the government is spending on the energy efficiency tax incentives, the new measures will save 2.5 quad btu (about 2 percent) of projected energy use in 2020, reduce energy bills by more than $20 billion, and reduce carbon dioxide by about 15 million metric tons.[208] Energy-savings tax measures can produce significant cost savings and contribute to environmental improvements.

In conclusion, even though the U.S. government acknowledges the serious problems created by fossil fuel use, and the inescapable reality that domestic supplies are insufficient to meet our needs, the national response has largely failed to provide a comprehensive strategy for battling the U.S. dependence on oil. For many decades now, America's leaders have understood the sobering realities that stem from our reliance on fossil fuels: (1) that domestic supplies are insufficient to keep up with domestic demand; (2) that such reliance compromises our national security, both as a result of our inability to keep sufficient oil reserves to defend ourselves in time of war and because relying on foreign sources of oil leaves the U.S. at the mercy of foreign governments;[209] and (3) that fossil fuel use degrades our environment and contributes to related problems concerning health effects and social costs. The U.S. has poured billions – trillions – into increasing domestic oil supplies. Despite some fuel efficiency improvements, however, oil consumption and oil imports continue to rise.[210] Furthermore, the America's inability to control relationships with countries in the Middle East (our chief foreign oil source),[211] and our inability to maintain the Strategic Petroleum Reserve leave us vulnerable to security threats. The U.S. experience in subsidizing the development of the fossil fuel industry can provide valuable lessons when evaluating options for shifting to renewable energy technologies. In addition, the interplay between incentives supporting fossil fuels and incentives encouraging alternative energy sources sends conflicting messages. The United States needs to formulate a strategy to eliminate fossil fuel subsidies in favor of alternatives. Tax incentives can play an important role in achieving that goal.

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[207] Quinlan, supra note --, at 27-28.
[208] Nadel, supra note --, at 15.
[209] *See* GEN. ACCOUNTING OFFICE, GAO/RCED-97-6, ENERGY SECURITY: EVALUATING U.S. VULNERABILITY TO OIL SUPPLY DISRUPTIONS AND OPTIONS FOR MITIGATING THEIR EFFECTS 2 (1996) [hereinafter GAO, U.S. VULNERABILITY].
[210] The U.S. imports of oil constitute over 60 percent of consumption. Lazzari Economic Analysis at 10.
[211] *See* EIA, ANNUAL ENERGY REVIEW, *supra* note __, at 164.